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THE CARIDEA AND STOMATOPODA OF THE SECOND TEMPLETON CROCKER-AMERICAN MUSEUM EXPEDITION TO THE PACIFIC OCEAN

BY JOHN C. ARMSTRONG

The itinerary and personnel of the expedition, which was made possible through the generosity of Mr. Templeton Crocker, who accompanied it, and led by Dr. Roy W. Miner of the Department of Living invertebrates of The American Museum of Natural History, have been fully described by Melbourne Ward in the report of the Brachyura.[1] The work was undertaken on board Mr. Crocker's yacht, "Zaca," during the winter of 1936.

The collection of Caridea and Stomatopoda comprises thirty-one species of carids and four of stomatopods. Of these, two species of Caridea, *Crangon crockeri* and *Lysmata zacae*, have been described as new.

With the exception of *Gnathophyllum panamense* previously known only from Panama and of the new species, all the Caridea taken are known from the Indo-Pacific region, some of them having been reported as far west as the Red Sea or the Seychelles Islands. The four species of stomatopods are all known to have wide ranges in the Indo-Pacific region. In fact, so widespread is this fauna that, while the Crocker collections constitute a very valuable addition to our scanty knowledge of the distribution of Pacific Caridea and Stomatopoda, it does not seem advisable to enter into any detailed comparisons with other faunas at this time.

CARIDEA

Leptochela robusta Stimpson

Leptochela robusta STIMPSON, W., 1860, Proc. Phil. Acad. Nat. Sci., p. 43.—DE MAN, J. G., 1920, "Siboga" Exped. Mongr. XXXIX a3, p. 19.—KEMP, S., 1925, Rec. Ind. Mus., XXVII, p. 252.

SPECIMENS COLLECTED.—14 males, 2 females, 1 immature taken at submerged light, Apia Harbor, Upolu Island, Samoa, Oct. 12.

REMARKS.—These specimens differ slightly from de Man's figures in that the second (middle) pair of dorsal spines on the telson are much smaller than those of the other two pairs and are placed a little nearer the lateral margin of the telson than are the third. Both the females lack the dorsal carinae on the carapace indicating, according to Kemp (1925, p. 250), that they have not born eggs at least since the last molt.

The sex ratio of both this species and the following is unusual among the Caridea, many carids having a far greater number of females than males. It is suggestive that collections of *L. robusta* made with nets in other localities have shown the type of sex ratio usual among the carids. The hypothesis is, therefore, tentatively advanced that the anomalous sex ratio of the present collection may be due to the fact it was made at a submerged light which may exert a greater attraction upon the males than the females.

Leptochela aculeocaudata hainanensis Yü

Leptochela hainanensis YÜ, S. C., 1936, Chin. Jour. Zool., II, p. 87, Figs. 1–3.

SPECIMENS COLLECTED.—3 females and 26 males taken at submerged light, Apia Harbor, Upolu Island, Samoa, Oct. 12.

REMARKS.—The specimens taken at Samoa differ from the extensive descriptions of *aculeocaudata* given by Kemp[2,3] in the length of the rostrum and the

[1] 1939, A.M.N.H. Novitates, No. 1049, pp. 1–15, Figs. 1–17.

[2] 1915, Mem. Ind. Mus., V, 310–316.
[3] 1925, Rec. Ind. Mus., XXVII, pp. 254–255.

proportions of certain appendages. While these differences, summarized in tabular form below, appear to be sufficient to distinguish the populations involved, it is not believed that they warrant a specific separation. The material shows a considerable range of variation in all the distinguishing characters, most of these tending to merge at the extremities of variation. Indeed, if we are willing to ascribe to *aculeocaudata* even a somewhat lesser degree of variability, then all these characters will so merge. That we are not dealing with a mixed population of two species seems to be indicated by the continuous nature of the variation in most of these features and by the fact that in the present material these may vary independently; individuals which resemble the typical form in one character may be far removed in another. As most of the specimens can be readily separated from the typical form as defined by Kemp, I believe that it had best be treated as a subspecies for the present.

The question of its identity with Yü's *hainanensis* remains. The characters given by Yü[1] as distinguishing *hainanensis* from *aculeocaudata* are: (1) The antennal scale is broader; 3 times as long as wide rather than 4 times. The outer margin is nearly straight, not concave behind the middle. (2) The exopod of the fifth pair of pereiopods is shorter reaching only a little beyond the distal end of the basis rather than "reaching not much beyond the middle of the ischium."[2] (3) Of the five pairs of spines at the apex of the telson the outer (first) pair extend only to the middle of the third pair and the second pair reach at least two-thirds of the length of the fourth, while in *aculeocaudata* the first pair extend almost to the end of the third pair and the second pair reach only to the middle of the fourth pair.

Only in the first of these do we find any point of difference with our Samoa specimens. Only one of our specimens had an antennal scale that measured fully 3 times as long as wide; the mean was about 3.5. The outer margin of most of the scales, while somewhat straighter than Kemp's figure of *aculeocaudata*, had more of a concavity than in Yü's figure. The exopod of the fifth leg does appear to be shorter in most specimens than indicated by Kemp but this feature does not lend itself to an accurate comparison with the published data as the obliquity of the baso-ischium articulation is such that the exopod may appear to be near the middle of the ischium when seen from one angle and scarcely to exceed the articulation when viewed from another. There appears also to be some variation in the length of that appendage. As may be seen from Table IX, the length of the apical telson spines is in agreement with Yü's description.

In the absence of any more critically diagnostic feature than the somewhat tenuous difference in the proportions of the antennal scale, I have provisionally placed the Samoa form under Yü's name until a more exhaustive study can be made of the range of variations in the forms involved.

While the tricarination of the carapace of the males of the Samoa material is a very curious feature not having been previously reported in any species of *Leptochela* thus far described, the presence or absence of these carinae in the females is known to be related to the sexual condition of the individuals and I do not believe that any systematic reliance can be placed on this character until it is known whether their appearance on the males may not also be dependent on some such condition.

As many of the characters which separate *hainanensis* from *aculeocaudata* tend to approach the condition in *pugnax*, the tabular view of their characters has included the latter species. The characters of *aculeocaudata* have been taken from Kemp;[3,4] those of *pugnax* from Kemp[4] and de Man.[5]

[1] 1936, Chin. Jour. Zool., II, p. 87, Figs. 1–3.
[2] 1925, Rec. Ind. Mus., XXVII, pp. 254–255.
[3] 1915, Mem. Ind. Mus., V, pp. 310–316.
[4] 1925, Rec. Ind. Mus., XXVII, pp. 254–255.
[5] 1920, "Siboga" Exped. Mongr. XXXIX a3, pp. 26–30, Pl. IV, figs. 8–8d.

aculeocaudata, s. s.	*aculeocaudata hainanensis*	*pugnax*
1.—The rostrum extends to the middle of the cornea or to the end of the eye and does not reach the end of the basal antennular segment	The rostrum reaches to or beyond the end of the eye and sometimes to the middle of the second antennular segment (Table I)	The rostrum reaches to or beyond the end of the eye often extending to the distal end of the basal antennular segment
2.—Carapace tricarinate in ovigerous or recently ovigerous females only	Carapace tricarinate in both males and females	Same as *aculeocaudata*
3.—The antennal spine is absent and the orbital margin is not serrated	Same as the typical form	The antennal spine is present; the orbital margin is not serrated
4.—The antennal scale is about 4 times as long as wide	The antennal scale is from 3 to 4 times as long as wide, usually about 3.5 (Table II)	The antennal scale is about 4 times as long as wide
5.—The antennular peduncle reaches a little beyond the middle of the antennal scale	The antennular peduncle reaches distinctly beyond the middle, usually about to the distal third of the antennal scale (Table III)	The antennular peduncle reaches to the distal third of the antennal scale
6.—The penultimate segment of the third maxilliped is from 1.25 to 1.28 times the length of the ultimate segment	The penultimate segment of the third maxilliped is from 1.3–1.4 times the length of the ultimate segment (Table IV)	The penultimate segment of the third maxilliped is about 1.4 times as long as the ultimate segment
7.—In the second leg the fingers are usually decidedly less than twice as long as the palm, about 1.75 times, very rarely just twice as long. There are from 18–25 spines on the inner margin of the dactylus and from 21 to 28 on the fixed finger	In the second leg the fingers are from 2.0 to 2.4 times, usually about 2.2 to 2.3 times, as long as the palm. There are from 17 to 26 spines on the inner margin of the dactylus and from 18 to 30 on the fixed finger (Tables V and VI)	In the second leg the fingers are from 2.0 to 2.25 times as long as the palm. There are from 17 to 23 spines on the inner margin of the dactylus and from 19 to 28 on the fixed finger
8.—There are from 10 to 15 spines on the external margin of the outer uropod and from 3 to 5 on the upper surface of the inner uropod near the apex	There are from 10 to 14 spines on the external margin of the outer uropod and from 3 to 5 on the upper surface of the inner uropod near the apex (Tables VII and VIII)	There are from 9 to 11 spines on the external margin of the outer uropod and 3 or 4 on the upper surface of the inner
9.—Of the five pairs of spines of the apex of the telson the outer (first) pair extend almost to the end of the third pair. The second pair reach to the middle of the fourth pair	Of the five pairs of spines at the apex of the telson, the outer pair fall well short of the end of the third pair. The second pair reach beyond the middle (usually about to the distal third) of the fourth pair (Table IX)	Of the five pairs of spines at the apex of the telson, the outer pair extend about one-third the length of the third pair. The second pair reach a little beyond the middle of the fourth pair[1]

[1] Proportions deduced from de Man's figure (1920, *op. cit.*, XXXIX a3).

Variations in *Leptochela aculeocaudata hainanensis*

TABLE I

Length of Rostrum

LENGTH OF ROSTRUM	NO. OF SPECIMENS
Reaching to middle of second antennular segment	1
Slightly exceeding the end of first antennular segment	4
Reaching to end of first antennular segment	6
Reaching to end of eyes but falling a little short of the end of first antennular segment	8
Falling just short of the end of the eyes but in advance of the middle of the cornea	

TABLE II

Ratio of the Length of the Antennal Scale to Its Greatest Width

LENGTH/WIDTH	NO. OF SPECIMENS
3.0	1
3.1	0
3.2	0
3.3	1
3.4	2
3.5	7
3.6	3
3.7	1
3.8	2
3.9	0
4.0	2

TABLE III

Distance along the Antennal Scale to Which the Antennular Peduncle Extends Expressed as the Ratio of That Distance to the Length of the Antennal Scale

ANTENNULAR PEDUNCLE/SCALE	NO. OF SPECIMENS
0.63	1
0.69	1
0.71	1
0.74	1
0.77	3
0.78	2
0.79	4
0.80	2
0.81	1
0.82	1
0.83	1

TABLE IV

Ratio of the Length of the Penultimate to the Length of the Ultimate Segment of the Third Maxilliped

PENULTIMATE/ULTIMATE	NUMBER OF MAXILLIPEDS
1.30–1.34	27
1.35–1.40	13

TABLE V

Number of Spines on the Fingers of the Second Chela

NUMBER OF SPINES	NUMBER OF FIXED FINGERS	NUMBER OF MOVABLE FINGERS
17	0	1
18	1	0
19	0	0
20	0	2
21	0	0
22	0	2
23	1	2
24	2	3
25	2	2
26	5	2
27	0	0
28	2	0
29	2	0
30	1	0

TABLE VI

Ratio of the Length of the Fingers to the Length of the Palm of the Second Chela

FINGERS/PALM	NUMBER OF CHELAE
2.0	4
2.1	5
2.2	13
2.3	18
2.4	5

TABLE VII

Number of Spines on the External Margin of the Outer Uropods

NUMBER OF SPINES	NUMBER OF UROPODS
10	4
11	16
12	23
13	7
14	2

TABLE VIII

Number of Spines on the External Margin of the Inner Uropods

NUMBER OF SPINES	NUMBER OF UROPODS
3	5
4	35
5	9
6	2

TABLE IX

Relative Lengths of the Apical Spines on the Telson

Distance the first pair extends along the third pair. (Expressed as a fraction of the length of the third pair)		Distance the second pair extends along the fourth pair. (Expressed as a fraction of the length of the fourth pair)	
NUMBER OF TELSONS	LENGTH OF EXTENSION	NUMBER OF TELSONS	LENGTH OF EXTENSION
1	0.42	1	0.53
1	0.44	1	0.55
1	0.48	1	0.56
7	0.50	1	0.57
4	0.53	2	0.58
2	0.54	1	0.59
1	0.55	5	0.60
2	0.56	1	0.61
1	0.59	5	0.63
2	0.60	4	0.64
1	0.64	1	0.65
1	0.65	1	0.70
2	0.67	1	0.71

Thalassocaris crinita (Dana)

Regulus crinitus, DANA, J. D., 1852, U. S. Explor. Exped. Crust., I, p. 599, Pl. XXXIX, fig. 6a–h.

Thalassocaris crinitus, BALSS, H., 1914, Abh. Math.-Phys. Kl. K. Bayer. Akad. Wiss., Suppl. Bd. II, Abh. 10, p. 28.

T. crinita, DE MAN, J. G., 1920, "Siboga" Exped. Mongr., XXXIX a3, p. 95, Pl. IX, figs. 22–22o.—KEMP, S., 1925, Rec. Ind. Mus., XXVII, p. 284.

SPECIMENS COLLECTED.—2 males, taken in hand net at surface next to pier, Pago Pago Harbor, Samoa, Oct. 6. 1 female, taken at submerged light in lagoon, Omoko anchorage, Penrhyn Island, Sept. 18.

REMARKS.—One of the males has only two teeth on the outer margin of the scaphocerite instead of the three mentioned by de Man and present on the other two specimens.

Athanas djiboutensis Coutière

Athanas djiboutensis COUTIÈRE, H., 1897, Bull. Paris Mus , VI, p. 233.

A. sulcatipes BORRADAILE, L. A., 1898, Proc. Zool. Soc. London, p. 1011, Pl. LXV, fig. 9.

SPECIMENS COLLECTED.—1 ovigerous female from broken up masses of coral, depth 2.3 feet, west of anchorage, Mataatu Harbor, Savaii, Oct. 11.

Alpheopsis aequalis Coutière

Figure 1

Alpheopsis aequalis COUTIÈRE, H., 1896, Bull. Mus. Paris, II, p. 382; 1899, Ann. Sci. Nat. Zool., (8) IX, p. 496; 1905, Fauna and Geog. Mald. and Lacc. Arch., II, pt. I, Report 6, p. 869, Fig. 138; 1906, Bull. Mus. Paris, XII, p. 377.—DE MAN, J. G., 1911, "Siboga" Exped. Mongr. XXXIX a1, p. 177.

A. consobrinus DE MAN, 1910, Tijdschr. d. Ned. Dierk. Vereen., (2) XI, p. 305; 1911, "Siboga" Exped. Mongr. XXXIX a1, p. 178, Pl. v, fig. 16.

SPECIMENS COLLECTED.—4 females (1 ovigerous) from broken up masses of coral, shallow water, Mataatu Harbor, Savaii, eastern reef, Oct. 15. 1 female, 1 male from broken up masses of coral, depth 8 feet, same locality, Oct. 17. 1 ovigerous female, 1 male from broken up masses of coral, depth 6 feet, same locality, Oct. 18.

REMARKS.—In addition to the specimens listed above, 5 other females in the collections of The American Museum of Natural History have been examined. The series of specimens thus available shows a greater range of variation than had previously been suspected to exist in the species and has led me to include in it both de Man's *A. consobrinus* and some West Indian examples which at first sight appeared to be distinct.

A. equalis was described by Coutière in 1896 in a very brief diagnosis of two lines, without a figure, based upon two specimens from the Red Sea and two from the Indian Ocean. Later in 1899 he added the information that the color of the living animal was "...d'une color orangée uniforme, légèrement plus foncées à l'extrémité des pinces; ..." and in 1905, by way of comparison with a new variety (*A. a.* var. *truncatus*), gave figures of both the dorsal and lateral views of the frontal structures of the type. In 1906 he published a key to the species of the genus without, however, adding anything to the known characters of the *A. equalis*. Among the alpheopsids collected by the "Siboga," de Man found a single specimen of a species whose possession of a pterygostomial spine led him to consider it as distinct from *aequalis*. As will be seen below, this form, so described and figured by de Man, is most probably identical with Coutière's.

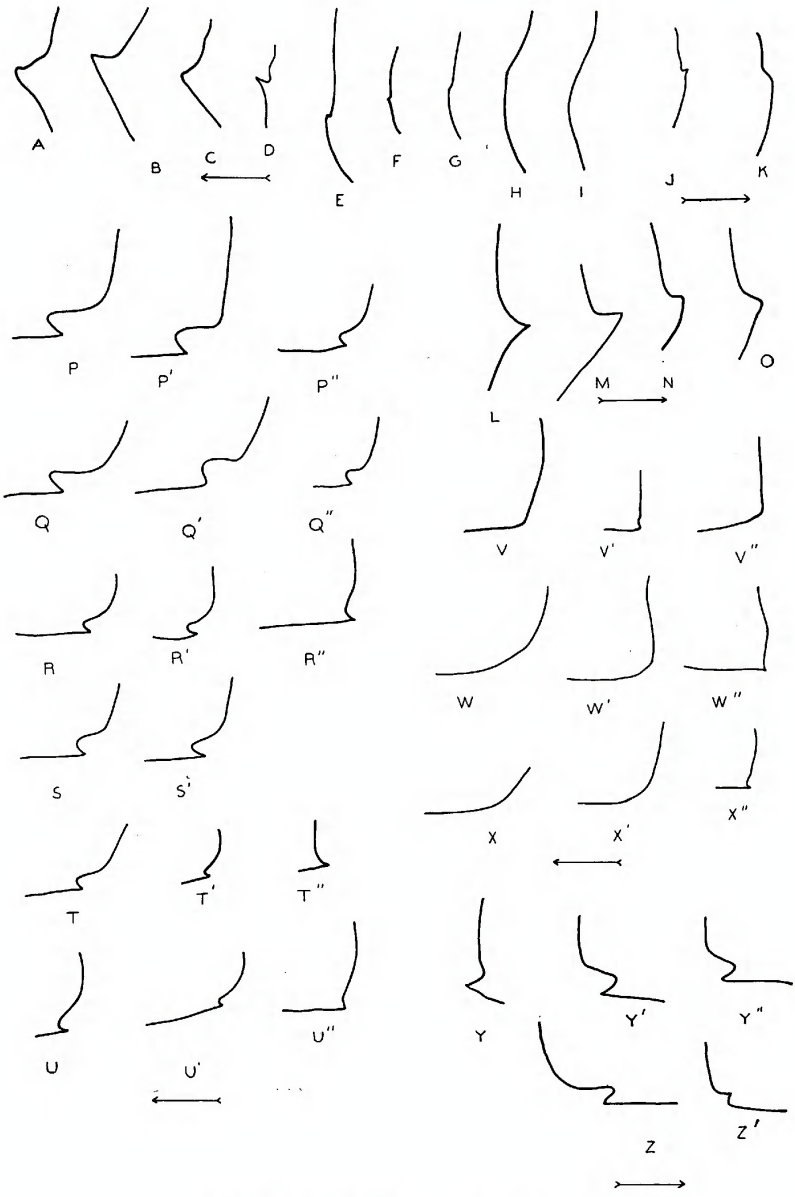

Fig. 1. *Alpheopsis aequalis* Coutière

(Arrows point toward the head of the animal)

A–I, pterygostomial angle of the left side of specimens A, D, C, K, B, E, G, H and F; J–O, pterygostomial angle of the right side of specimens M, E, D, B and C; P, P′, P″–X, X′, X″, posterior borders of the left third, fourth and fifth pleura of specimens F, D, H, A, G, I, C, M and K; Y, Y′ Y″, and Z, Z′, posterior borders of the right third, fourth and fifth pleura of specimen E and of the right and fourth pleura of specimen I.

TABLE X

Variations in the Proportions of *Alpheopsis aequalis* Coutière

Specimen		A	B	C	D	E	F	G	H	I	J	K	L	M
Length of carapace in mm.		3.74	3.24	5.89	2.89	3.42	4.05	4.16	3.74	4.38	5.45	3.74	3.3	3.2
No. of seg. of antenna before division		3	2	4	1	2	2	2	2	2	2	3	3	3
Length of rostrum[1]		G1	E1	G1	E2	M2	M2	L1	L1	G1	G2	L1	L1	E1
Length of stylocerite[1]		G2	G1	E3	M3	M3	E3	M3	M3	M3	E3	E2	M2	L3
Proportions of carpal segments and chela of second cheliped. (Relative to the first carpal segment)	1st	1	1	1	1	1	1	X	1	1	1	1	1	1
	2nd	0.38	0.4	0.445	0.475	0.45	0.50	X	0.465	0.4	0.425	0.371	0.485	0.324
	3rd	0.36	0.374	0.445	0.475	0.45	0.544	X	0.44	0.428	0.41	0.46	0.428	0.324
	4th	0.38	0.374	0.445	0.475	0.415	0.50	X	0.465	0.428	0.425	0.485	0.428	0.324
	5th	0.36	0.4	0.555	0.715	0.585	0.665	X	0.666	0.713	0.75	0.514	0.428	0.405
	Chela	0.62	0.75	0.89	1.00	0.97	1.00	X	1.00	1.14	1.38	1.00	0.86	0.81
Proportions of length and width of carpal segments of second chela	1st	7	6.7	5	3	4.15	4.3	X	3.86	3.18	4.0	4.38	5.0	5.0
	2nd	2.7	2.66	2.22	1.68	1.86	2.14	X	2.00	1.4	1.44	1.85	2.43	2.00
	3rd	2.1	2.14	2.00	1.68	1.63	2.28	X	1.85	1.5	1.36	2.28	1.87	2.00
	4th	2.0	1.88	1.8	1.68	1.33	1.86	X	1.75	1.5	1.31	2.12	2.14	1.715
	5th	1.9	2	2.38	2.14	1.9	2.22	X	2.22	2.0	2.31	1.80	2.14	1.875
Length/width of segments of 3rd leg	Dactylus	8.75	11	7.3	6.66	6	5.20	5.5	6.00	5.38	X	7.6	5.0	9.33
	Propodus	14.3	15	14	11.7	12.4	9.45	10.5	11.5	9.55	X	10.07	10.0	7.15
	Carpus	6.25	6.25	5.85	6.45	4.0	4.5	6.12	4.28	4.5	X	5.50	6.25	5.23
	Merus	7.3	7.8	6.76	6	6.66	6.54	5.55	5.34	5.3	X	6.08	6.84	5.00
Relative lengths of segments of 3rd leg. (Relative to merus)	Dactylus	0.44	0.57	0.356	0.33	0.376	0.36	0.33	0.376	0.368	X	0.447	0.305	0.51
	Propodus	1.25	1.17	1.13	1.17	1.19	1.00	1.05	1.15	0.9	X	1.01	0.976	0.908
	Carpus	0.625	0.65	0.575	0.75	0.50	0.53	0.55	0.587	0.539	X	0.647	0.61	0.728
	Merus	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	X	1.00	1.00	1.00
No. of spines on ischium of 3rd leg		2	2	2	1	1	1	1	1	1	X	2	0	2
Length/width merus of second leg.		8.8	9.3	7.5	8.35	X	7.00	X	X	5.66	6.25	X	8.40	7.88

Specimens designated by letter are as follows: A, female (ovig.) from Savaii, Oct. 18; B, male from Savaii, Oct. 17; C, female (ovig.) from Savaii, Oct. 15, D, female from Savaii, Oct. 15; E, male from Savaii, Oct. 17; F, male from Savaii, Oct. 17; G, female from Savaii, Oct. 15; H, female from Savaii, Oct. 15; I, female (ovig.) from French Somaliland, coll. by Dr. B. Brown; J, female from Somaliland, coll. by Dr. B. Brown; K, female from Cayo Cristo, 4 miles N. of Isabella, 25 miles N. of Iagua la Grande, Cuba, dredged from 3–4 ft. depth, coll. by Dr. B. Brown; L, female from Bermuda, from broken up masses of coral 6–8 ft. depth, coll. by author; M, female from Barahona Harbor, Santo Domingo, dredged in 12–18 ft., coll. by author.

[1] L1, falls short of end of first segment; E1, reaches to end of first segment; G1, exceeds first segment; M2, reaches to middle of second segment; E2, reaches to end of second segment; G2, exceeds second segment; M3, reaches to middle of third segment; L3, falls short of end of third segment; E3, reaches to end of third segment.

As shown in figure 1, the development of the pterygostomial spine is extremely variable and does not afford any basis for specific distinction. The proportions of the appendages measured (Table X) likewise present no discontinuity sufficiently marked to serve as a specific character in the material available. The Atlantic material differs from most of the Pacific specimens in having smooth unarmed posterior borders on the pleura. However, this character also shows a considerable range of variation (Fig. 1) and, as one of the females from Savaii has pleura almost identical with those of the Atlantic specimens, it does not seem possible to separate the Atlantic and Pacific forms as distinct species on the basis of this character. A single point of difference remains between Coutière's descriptions of *aequalis* and our material. The female collected at Bermuda was marked with broad, vertical, red bands on a transparent body and two of the females from Savaii still show traces of a similar color pattern while the specimens collected by Coutière at Djibouti were said to be uniformly orange.

In view of the wide variation in the morphological characters studied and the lack of information concerning the range of variation in the color pattern, I think that it may be concluded that we are here dealing with a single widely distributed and variable species which must then be given the name of *Alpheopsis aequalis* Coutière.

Crangon crockeri, new species

Figures 2 and 3

Specimens Collected.—Type, 1 male. A.-M.N.H. Cat. No. 9205. From broken up masses of coral, shallow water, eastern reef, Mataatu Harbor, Savaii, Oct. 15.

Description of Type.—The rostrum, one and one-half times as long as wide at the base, falls short of the second antennular article by about two-thirds of the length of the rostrum. The orbital hoods are armed with slender spines which fall short of the end of the rostrum by one-third of the length of the rostrum.

The stylocerite reaches to the end of the first antennular article. The second antennular article is 2.4 times as long as wide and 1.7 times as long as the second.

The basicerite is armed with a strong spine that reaches to the basal articulation of the carpocerite. The scaphocerite, slightly less than 3 times as long as wide, is equivalent in length (including the terminal spine) to the antennular peduncle. The carpocerite, slightly more than 4.5 times as long as wide, exceeds the antennular peduncle by a very small amount. (On the left side of the type this appears to be about 0.16 of the length of the terminal segment of the antennular peduncle when the carpocerite is placed directly under that appendage.)

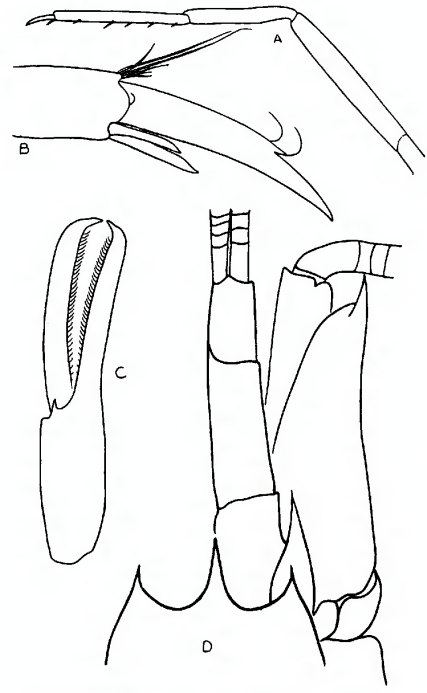

Fig. 2. *Crangon crockeri*, new species
A, third leg; B, dactyl of same leg; C, small first chela; D, frontal and antennal structures.

The third maxillipeds fall short of the end of the antennal peduncle by a little less than one third of the length of their terminal segment. The ultimate segment is 1.4 times the length of the penultimate.

The merus of the larger chela, 2.6 times as long as wide, is unarmed on the upper margin but bears 11 small spinules along the lower margin, in addition to the strong spine which forms the distal extremity of that margin. The chela is 3 times as long as wide. The truncate finger is 0.28 times as long as the palm.

The merus of the smaller chela, 2.8 times as long as wide, is unarmed along the upper margin but bears 13 small spinules along the lower border in addition to the strong spine which forms the distal extremity of that margin. The chela is 4.8 times as long as wide. The fingers, 1.2 times as long as the palm, are slender and slightly

curved. The cutting edge of the fingers bears a comb-like row of stout, curved setae on both sides while the cutting edge itself is sculptured by a series of very fine obliquely transverse ridges.

The carpal segments of the second pair of chelae are in the ratio: 1st (proximal) 1.0; 2nd 0.6; 3rd 0.33; 4th 0.35; 5th 0.54; chela 0.77.

The merus of the third legs is 7.2 times as long as wide. The propodus is armed with five spinules along the posterior margin and a pair at the distal extremity. The dactylus bears a small accessory claw on the upper margin at about the distal third of its length. A pair of curved setae arises just behind this accessory claw.

The telson is 1.8 times as long as wide at the base.

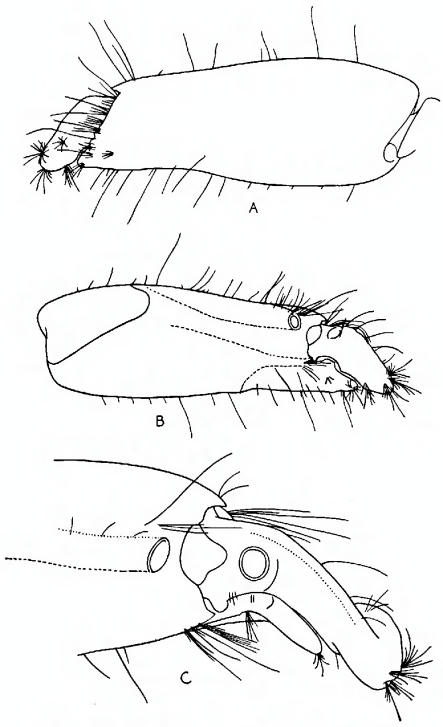

Fig. 3. *Crangon crockeri*, new species
A, large first chela, inner side; B, outer side of same chela; C, dactyl and anterior portion of palm of same chela.

DISCUSSION.—*C. crockeri* appears to be most closely related to *C. assimulans* (de Man) and only slightly less so to *C. hailstoni* (Coutière). From both these species *crockeri* may be distinguished by the complete absence of the transverse groove on the inner face of the large chela. Both de Man's[1] figure of *assimulans* and Coutière's[2] of *hailstonei* show this groove to be represented by a conspicuous notch. Also the fourth carpal article of *crockeri* is shorter than either the second or the fifth while in *assimulans* it is "...usually as long as the second and as long as the fifth"[1] and in *hailstonei* it is "as long as the second and as long as the fifth."[2]

Crangon collumianus (Stimpson)

Alpheus collumianus STIMPSON, W., 1860, Proc. Phil. Acad. Nat. Sci., p. 30.—DE MAN, J. G., 1911, "Siboga" Exped. Mongr. XXXIX a1, p. 334.

SPECIMENS COLLECTED.—1 female from broken up masses of coral, depth 2.3 feet, west of anchorage, Mataatu Harbor, Savaii, Oct. 18.

Crangon ventrosus (H. Milne-Edwards)

Alpheus ventrosus MILNE-EDWARDS, H., 1837, Hist. Nat. Crust., p. 352.—DE MAN, J. G., 1911, "Siboga" Exped. Mongr. XXXIX a1, p. 207.

SPECIMENS COLLECTED.—10 males, 10 females (4 ovigerous) from broken up masses of coral, shallow water, Mataatu Harbor, Savaii, eastern reef, Oct. 15. 4 males, 7 females (2 ovigerous), from broken up masses of coral, depth 3–5 feet, same locality, Oct. 16. 11 males, 17 females (10 ovigerous), 2 young, from broken up masses of coral, depth 8 feet, same locality, Oct. 17. 4 males, 6 females (4 ovigerous), from broken up masses of coral, depth 8 feet, same locality, Oct. 18.

Crangon obesomanus (Dana)

Alpheus obesomanus DANA, J. D., 1852, U. S. Explor. Exped. Crust., I, p. 547, Pl. XXXIV, fig. 7.

SPECIMENS COLLECTED.—1 male, 1 female (ovigerous) from broken up masses of coral, depth 8 feet, Mataatu Harbor, Savaii, eastern reef, Oct. 17.

Crangon phrygianus (Coutière)

Alpheus phrygianus COUTIÈRE, H., 1905, Mald. and Lacc. Arch., p. 886, Pl. LXXVI, fig. 25.

SPECIMENS COLLECTED.—1 female from broken up coral masses, depth 6 feet, Mataatu Harbor, Savii, Oct. 18.

[1] 1911, "Siboga" Exped. Mongr. XXXIX a1, p. 199, Pl. XIV, fig. 64.
[2] 1905, Mald. and Lacc. Arch., p. 879, Pl. LXXIV fig. 18.

Crangon alcyone (de Man)

Alpheus alcyone DE MAN, J. G., 1903, Abhand. Senck. Natur. Gesell., XXV, p. 870, Pl. XXVII, fig. 61.

Alpheus aculeipes COUTIÈRE, H., 1905, Mald. and Lacc. Arch., p. 892, Pl. LXXIX, fig. 31.

Alpheus alcyone DE MAN, J. G., 1911, "Siboga" Exped. Mongr. XXXIX a1, p. 351.

SPECIMENS COLLECTED.—6 ovigerous females and 3 males from broken up masses of coral, depth 6 feet, Mataatu Harbor, Savaii, Oct. 18.

Crangon frontalis (H. Milne-Edwards)

Alpheus frontalis MILNE-EDWARDS, H., 1837, Hist. Nat. Crust., II, p. 356.

Alpheus latifrons DE MAN, J. G., 1888, Archiv f. Naturg., LIII, p. 521, Pl. XXII.

Alpheus frontalis DE MAN, J. G., 1911, "Siboga" Exped. Mongr. XXXIX a1, p. 369.

SPECIMENS COLLECTED.—1 male, 1 female from anchorage, Mataatu Harbor, Savaii, Oct. 16.

Crangon gracilipes (Stimpson)

Alpheus gracilipes STIMPSON, W., 1860, Proc. Phil. Acad. Nat. Sci., p. 31.—DE MAN, J. G., 1911, "Siboga" Exped. Mongr. XXXIX a1, p. 380.

SPECIMENS COLLECTED.—4 females (2 ovigerous), 2 males from broken up masses of coral, shallow water, Mataatu Harbor, Savaii, eastern reef, Oct. 15. 1 female (ovigerous) from broken up masses of coral, depth 3–5 feet, same locality, Oct. 16. 1 female (ovigerous) from broken up masses of coral, depth 8 feet, same locality, Oct. 17. 1 male from broken up masses of coral, depth 6 feet, same locality, Oct. 18.

Crangon parvirostris (Dana)

Alpheus parvi-rostris DANA, J. D., 1852, U. S. Explor. Exped., Crust., I, p. 551, Pl. XXXV, fig. 3.

SPECIMENS COLLECTED.—4 males, 4 females (3 ovigerous) from broken up coral masses, depth 6 feet, Mataatu Harbor, Savaii, Oct. 18.

Synalpheus theophane de Man

Synalpheus theophane DE MAN, J. D., 1910, Tijdschr. d. Ned. Dierk. Vereen., (2) XI, p. 292.

SPECIMENS COLLECTED.—2 females (ovigerous) from broken up masses of coral, shallow water, Mataatu Harbor, Savaii, eastern reef, Oct. 15.

Saron marmoratus (Olivier)

Saron marmoratus BORRADAILE, L. A., 1898, Proc. Zool. Soc. London, p. 1009 (syn.).—KEMP, S., 1914, Rec. Ind. Mus., X, p. 84 (syn.).

SPECIMENS COLLECTED.—1 male from anchorage, Penrhyn Island, "caught off boat near submerged light," Sept. 25. 1 female from anchorage, Pago Pago, Samoa, caught near submerged light, Oct. 10. 3 females (1 ovigerous) from broken up coral masses, depth 3–5 feet, Mataatu Harbor, Savaii, west reef, Oct. 16. 1 female from broken up coral masses, depth 8 feet, Mataatu Harbor, Savaii, Oct. 17.

Saron neglectus de Man

Saron neglectus DE MAN, J. G., 1903, Abhand. Senck. Natur. Gesell., XXV, p. 854, Pl. XXVI, fig. 58.

SPECIMENS COLLECTED.—1 male, 1 female (ovigerous) from broken up masses of coral, shallow water, Mataatu Harbor, Savaii, eastern reef, Oct. 15. 1 male, 2 females (1 ovigerous) from broken up masses of coral, depth 3–5 feet, Mataatu Harbor, Savaii, west reef, Oct. 16. 6 males, 9 females (8 ovigerous) from broken up coral masses, depth 8 feet, same locality, Oct. 17.

Lysmata zacae, new species

Figure 4

SPECIMENS COLLECTED.—Holotype, 1 female, carapace length 5.1 mm., Cat. No. A.M.N.H. 9204, from broken up masses of coral, depth 8 feet, Mataatu Harbor, Savaii, eastern reef, Oct. 17; paratypes, 1 female, 1 male, same locality, Oct. 15.

DESCRIPTION.—The rostrum, reaching to the end of the second antennular article, bears 6 teeth (the three posterior ones being on the carapace) on the straight upper margin and 4 much smaller teeth on the lower margin, the first lower tooth being placed just anterior to the penultimate dorsal tooth. The proximal unarmed portion of the lower margin is concave; the distal portion bearing the teeth is gently convex.

The large antennal spine is the only spine present on the carapace.

The lateral process of the first antennular article is very small and almost completely concealed by the eyes. It is sharply pointed anteriorly and reaches about one-third the length of the first segment. The fused part of the inner antennular segment is composed of 6 segments and is about one and one-half times as long as the thicker ramus of the free portion.

The antennal scale which reaches to the end of the antennular peduncle is slightly less than

five times as long as wide and has nearly parallel margins. The concave outer margin terminates in a spine which does not exceed the blade.

The third maxillipeds exceed the antennular peduncle by about one-half the length of the penultimate article, the latter being one-half the length of the ultimate.

The first pereiopods are slender and exceed the antennular peduncle by the length of the chela. The carpus is a little over one and one-half times as long as the merus and a little less than one and one-half times as long as the chela. The fingers of the chela have unarmed cutting edges, slender acute tips which cross when the claw is shut. The fingers are a little less than one-half

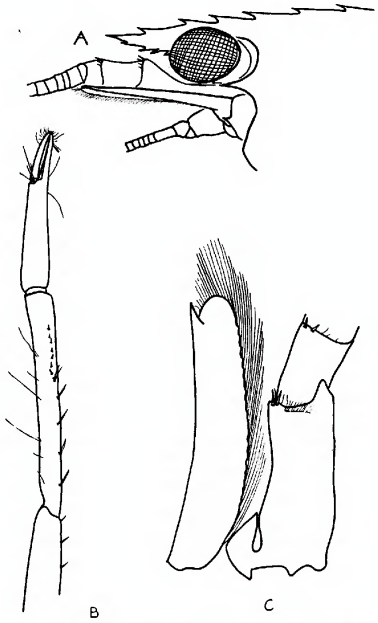

Fig. 4. *Lysmata zacae*, new species

A, frontal and antennal structures; B, first chela; C, antennal scale and basal portion of the antennular peduncle.

(0.425 in the female paratype) times as long as the palm.

The second pair of pereiopods reach beyond the antennular peduncle by the chela, carpus and one-fourth the length of the merus. The ischium and merus are annulate and the carpus consists of 32 segments. The chela is one and one-half times as long as the last carpal segment. The fixed finger and the dactylus are about equal in length and both bear two small teeth at the apex, the dactylus being as long as the palm.

The third leg reaches beyond the antennular peduncle by all of the dactylus, carpus and propodus. The merus, carpus and propodus are armed with a series of spinules along the posterior margin, those of the merus being the most conspicuous, those of the propodus the smallest with the spinules on the carpus about intermediate in size. The dactylus bears 5 large teeth (including the terminal) increasing in size distally. The fifth leg reaches beyond the antennular peduncle by the dactylus and about one-half the length of the propodus.

The fifth abdominal segment, measured dorsally, is three-fourths as long as the sixth. The telson is about one and one-half times as long as the sixth abdominal segment and shorter than either pair of uropods. Besides the two pairs of dorsal spines present in all three specimens, the type and the cotype have an extra, fifth spine on one side only; on the right in the type and on the left in the cotype. The lateral margins are setose over the posterior half of their length. The narrow apex, minutely pointed in the center, bears two pairs of spines on either side, the innermost being the longest. Inside of these innermost spines lie a pair of plumose setae so heavy that they give the appearance of another pair of terminal spines. They are a little shorter than the innermost pair of spines.

REMARKS.—Among the Pacific species of *Lysmata*, *zacae* resembles *acicula* (Rathbun)[1] and *seticaudata* var. *ternate* de Man[2] in the length of the rostrum. From *acicula* it may be distinguished by the antennal scale. This reaches to the end of the antennular peduncle in *zacae* and "...exceeds considerably the antennular peduncle and is nearly as long as the carapace, rostrum excluded" in *acicula*. Although Miss Rathbun states that in *acicula* the third maxilliped exceeds the antennal scale by only one-half the terminal segment and in *zacae* it exceeds that appendage by the whole of the terminal segment and half of the penultimate, this may be but another way of stating the difference in the length of the antennal scale. In her species the scale is nearly as long as the carapace while, in both of our two specimens still retaining these appendages, the scale is a little less than three-fourths the length of the carapace. The small difference in the number of carpal articles of the second pair of pereiopods, 32 in *zacae* and 29 in *acicula* may be due to individual variation. The small number of specimens; 5 mentioned by Miss Rathbun and 3 of *zacae* do not allow any analysis of that point. The only other characters given by Miss

[1] 1909, Bull. U. S. Fish. Comm., XXIII, pt. 2, p. 912.

[2] 1903, Abhand. Senck. Natur. Gesell., XXV, p. 846.

Rathbun which may be compared with our specimens are the length and armature of the rostrum. These are in complete agreement. From *seticauda* var. *ternate*, *zacae* may be distinguished by the free portion of the inner antennular peduncle being shorter than the fused part in *zacae* and longer in *seticauda* var. *ternate*. It is further excluded from de Man's species by the greater number of carpal segments in the second pair of pereiopods; 32 in *zacae* and 24 in *seticauda* var. *ternate*.

Thor pascalis (Heller)

Hippolyte pascalis HELLER, C., 1861, Sitz.-ber. Akad. Wiss. Wien., XLIV, p. 276, Pl. III, fig. 24.

Thor pascalis KEMP, S., 1914, Rec. Ind. Mus., X, p. 94, Pl. I, figs. 6–10.

SPECIMENS COLLECTED.—1 male from broken up coral masses, shallow water, Mataatu Harbor, Savaii, eastern reef, Oct. 15. 1 female (ovigerous) from broken up masses of coral, depth 3–5 feet, same locality, western reef, Oct. 16.

Rhynchocinites hendersoni Kemp

Rhynchocinites rugulosus HENDERSON, J. R., 1893, Trans. Linn. Soc. London, (2) Zool., V, p. 438.

Rhychocinites hendersoni KEMP, S., 1925, Rec. Ind. Mus., XXVII, p. 265.

SPECIMENS COLLECTED.—1 male, 1 female (ovigerous) from broken up masses of coral, depth 8 feet, Savaii, eastern reef, Oct. 17.

Macrobrachium lar (Fabricius)

Palaemon lar FABRICIUS, J. C., 1798, Supp. Ent. Syst., p. 402.—ORTMANN, A., 1891, Zool. Jahrb. Abt. Syst., V, p. 724 (syn.).

SPECIMENS COLLECTED.—1 male, Kapapa Islet, Oahu, Hawaii, November.

Periclimenes (Ancylocaris) amymone de Man

Periclimenes amymone DE MAN, J. D., 1903, Abhand. Senck. Natur. Gesell., XXV, p. 829, Pl. XXV, figs. 53a–g.

Periclimenes (*Ancylocaris*) *amymone*, KEMP, S., 1922, Rec. Ind. Mus., XXIV, p. 219.

SPECIMENS COLLECTED.—2 females from broken up masses of coral, shallow water, Mataatu Harbor, Savaii, eastern reef, Oct. 15. 8 females (7 ovigerous), 2 males from broken up masses of coral, depth 3–5 feet, same locality, western reef, Oct. 16. 1 female, 2 males from broken up masses of coral, depth 8 feet, same locality, Oct. 17.

Periclimenes (Ancylocaris) rotumanus Borradaile

Periclimenes rotumanus BORRADAILE, L. A., 1898, Proc. Zool. Soc. London, p. 1005, Pl. LXIV, figs. 5–5b.

Periclimenes (*Ancylocaris*) *rotumanus* KEMP, S., 1922, Rec. Ind. Mus., XXIV, p. 226.

SPECIMENS COLLECTED.—1 female (ovigerous) from broken up masses of coral, shallow water, Mataatu Harbor, Savaii, eastern reef, Oct. 15. 1 male from broken up masses of coral, depth 8 feet, same locality, Oct. 18.

Periclimenes (Ancylocaris) spiniferus de Man

Periclimenes petitthouaris var. *spiniferus* DE MAN, J. G., 1903, Abhand. Senck. Natur. Gesell., XXV, p. 824.

Periclimenes (*Flaciger*) *spiniferus*, BORRADAILE, L. A., 1917, Trans. Linn. Soc., (2) XVII, p. 369, Pl. LII.

Periclimenes (*Ancylocaris*) *spiniferus*, KEMP, S., 1922, Rec. Ind. Mus., XXIV, p. 195.

SPECIMENS COLLECTED.—2 males from broken up masses of coral, Mataatu Harbor, Savaii, Oct. 14. 1 male from broken up masses of coral, shallow water, same locality, eastern reef, Oct. 15. 1 female (ovigerous), 2 males from broken up masses of coral, depth 3–5 feet, same locality, western reef, Oct. 16. 3 females (ovigerous), depth 8 feet, same locality, eastern reef, Oct. 17. 1 female (ovigerous), 1 male from broken up masses of coral, depth 8 feet, same locality, Oct. 18.

Harpilius depressus Stimpson

Harpilius depressus STIMPSON, W., 1860, Proc. Acad. Sci. Phil., p. 38.—KEMP, S., 1922, Rec. Ind. Mus., XXIV, p. 231.

SPECIMENS COLLECTED.—2 females (ovigerous), 1 male from broken up masses of coral, depth 8 feet, Mataatu Harbor, Savaii, eastern reef, Oct. 17.

Harpilius gerlachei Nobili

Harpilius gerlachei NOBILI, G., 1905, Bull. Mus. Paris, XI, p. 160.—KEMP, S., 1922, Rec. Ind. Mus., XXIV, p. 238, Figs. 74–75.

SPECIMENS COLLECTED.—1 female (ovi-

gerous), 1 male from broken up masses of coral, depth 3–5 feet, Mataatu Harbor, Savaii, western reef, Oct. 16.

Coralliocaris graminea (Dana)

Oedipus graminea Dana, J. D., 1852, U. S. Explor. Exped., Crust., I, p. 573, Pl. xxxvii, fig. 3a–e.

Coralliocaris graminea, Kemp, S., 1922. Rec. Ind. Mus., XXIV, p. 269, Figs. 69–97.

Specimens Collected.—1 male from broken up coral masses, depth 2–3 feet, Mataatu Harbor, Savaii, Oct. 14. 2 females from broken up masses of coral, shallow water, Mataatu Harbor, Savaii, eastern reef, Oct. 15.

Coralliocaris lucina Nobili

Coralliocaris lucina Nobili, G., 1901, Ann. Mus. Univ. Napoli, (N. S.) I, 3, p. 5.—Kemp, S., 1922, Rec. Ind. Mus., XXIV, p. 276, Fig. 102.

Specimens Collected.—1 female from broken up masses of coral, shallow water, Mataatu Harbor, Savaii, eastern reef, Oct. 15. 9 females (6 ovigerous), 3 males from broken up masses of coral, depth 3–5 feet, same locality, western reef, Oct. 16. 4 females (ovigerous), 1 male from broken up masses of coral, depth 8 feet, eastern reef, Oct. 17.

Coralliocaris superba (Dana)

Oedipus superbus Dana, J. D., 1852, U. S. Explor. Exped., Crust., I, p. 575, Pl. xxxvii, figs. 2a–f.

Coralliocaris superba, Kemp, S., 1922, Rec. Ind. Mus., XXIV, p. 272, Figs. 98–99.

Specimens Collected.—7 females (ovigerous), 2 males from broken up masses of coral, depth 3–5 feet, Mataatu Harbor, Savaii, western reef, Oct. 16. 2 females (1 ovigerous), 2 males from broken up masses of coral, depth 8 feet, same locality, eastern reef, Oct. 17. 1 female (ovigerous) from broken up masses of coral, depth 6 feet, same locality, Oct. 18.

Coralliocaris venusta Kemp

Coralliocaris venusta Kemp, S., 1922, Rec. Ind. Mus., XXIV, p. 274, Fig. 100.

Specimens Collected.—5 females (1 ovigerous), 2 males from broken up masses of coral, depth 3–5 feet, Mataatu Harbor, Savaii, western reef, Oct. 16.

Remarks.—Kemp described this species from two specimens, one male and one female. His male had a single dorsal tooth on the rostrum, the female two, while both had a single ventral tooth. In the Savaii specimens this character shows somewhat more variation as follows: Females, 1/0, 2/1, 2/1 and 2/2, the remaining female having the rostrum broken so that the teeth could not be counted; males, both 1/1.

Conchodytes tridacnae Peters

Conchodytes tridacnae Borradaile, L. A., 1917, Trans. Linn. Soc., (2) XVII, p. 393 (syn.).—Kemp, S., 1922, Rec. Ind. Mus., XXIV, p. 283.

Specimens Collected.—1 female, found inside of 3-inch *Tridacna*, Penrhyn Island lagoon, Sept. 22.

Conchodytes meleagrinae Peters

Conchodytes meleagrinae Borradaile, L. A., 1917, Trans. Linn. Soc., (2) XVII, p. 393 (syn.).—Kemp, S., 1922, Rec. Ind. Mus., XXIV, p. 285.

Conchodytes biunguiculatus Boone, C. P., 1938, Bull. Vand. Mus., VI, p. 184, Pl. L.

Specimens Collected.—1 male, 1 female "found inside of pearl shell," Penrhyn Island, Sept. 20. 1 male "caught by hand and by breaking open coral specimens." East anchorage, 4 feet depth, Mataatu Harbor, Savaii, Oct. 13. 1 male, field data missing.

Gnathophyllum panamense Faxon

Gnathophyllum panamense Faxon, W., 1893, Bull. Mus. Comp. Zoöl., XXIV, p. 198; 1895, Mem. Mus. Comp. Zoöl., XVIII, p. 146, Pl. E.

Specimens Collected.—1 female (ovigerous) from broken up masses of coral, shallow water, Mataatu Harbor, Savaii, eastern reef, Oct. 15.

Processa jacobsoni de Man

Processa jacobsoni de Man, J. G., 1921, Zool. Med. ut. Rijks. Mus. Nat. Hist. Leiden, VI, p. 95.

Specimens Collected.—1 male from broken up masses of coral, shallow water, Mataatu Harbor, Savaii, eastern reef, Oct. 15.

STOMATOPODA

Pseudosquilla ornata Miers

Pseudosquilla ornata MIERS, E. J., 1880, Ann. Mag. Nat. Hist., (5) V, p. 111, figs. 5, 6.—KEMP, S., 1913, Mem. Ind. Mus., IV, p. 100.

SPECIMENS COLLECTED.—2 males, 2 females from broken up masses of coral, depth 8 feet, Mataatu Harbor, eastern reef, Savaii, Oct. 17. 2 males, 1 female from broken up masses of coral, depth 6 feet, Mataatu Harbor, Savaii, Oct. 18.

Lysosquilla maculata (Fabricius)

Squilla maculata FABRICIUS, S. C., 1793, Ent. Syst., II, p. 511.

Lysosquilla maculata KEMP, S., 1913, Mem. Ind. Mus., IV, p. 111, Pl. VIII, figs. 86–91.

SPECIMENS COLLECTED.—1 male, 155 mm. long, taken at surface near a submerged light about 8 P. M., anchorage, Penrhyn Island, Sept. 23.

Gonodactylus chiragra (Fabricius)

Squilla chiragra FABRICIUS, J. C., 1781, Species Insectorum, I, p. 515.

Gonodactylus chiragra, KEMP, S., 1913, Mem. Ind. Mus., IV, p. 155, Pl. IX, fig. 107.

SPECIMENS COLLECTED.—3 males from broken up masses of coral, shallow water, eastern reef, Mataatu Harbor, Savaii, Oct. 15, 1936. 2 females from broken up masses of coral, depth 8 feet, same locality, Oct. 17.

Gonodactylus glabrous Brooks

Gonodactylus glabrous BROOKS, W. K., 1886, "Challenger" Reports, XVI, p. 62, Pl. XIV, fig. 5; Pl. XV, figs. 7–9.—KEMP, S., 1913, Mem. Ind. Mus., IV, p. 167, Pl. IX, fig. 113.

SPECIMENS COLLECTED.—1 male from broken up masses of coral, depth 8 feet, eastern reef, Mataatu Harbor, Savaii, Oct. 17.